

Notice of Allowability

Application No.

09/650,626

Examiner

Jeffrey R. West

Applicant(s)

WILSON ET AL.

Art Unit

2857

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the After Final Response filed December 12, 2005.
2. ☒ The allowed claim(s) is/are 29 and 32-39.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☒ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☒ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Drawings

1. The informal drawings filed August 30, 2000, have been accepted by the Examiner. Applicant is required to furnish corresponding formal drawings in response to this Action.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.
3. Authorization for this examiner's amendment was given in a telephone interview with Douglas J. Christensen on January 05, 2005.
4. The application has been amended as follows:

In claim 29, line 2, "the operation of a plurality of digital channels under the direction" has been changed to ---operation of a plurality of digital channels under direction---.

In claim 29, line 15, "said individual" has been changed to ---an individual---.

In claim 35, line 1, "diagram includes" has been changed to ---diagrams include---.

In claim 36, line 2, "the instant" has been changed to ---an instant---.

In claim 38, line 2, "sequence diagram" has been changed to ---sequence diagrams---.

In claim 39, line 1, "diagram provides" has been changed to ---diagrams provide---.

Allowable Subject Matter

5. Claims 29 and 32-39 are considered to be allowable over the cited prior art for the following reasons:

U.S. Patent No. 5,754,451 to Williams discloses a computerized machine control monitoring system, wherein a CMC uses a control program to control the operation of a machine through a plurality of digital channels, that define a substantially complete machine (column 2, lines 54-61 and column 3, lines 4-9), comprising a data acquisition component that is in communication with the CMC and acquires transition data about the digital channels, an analysis component that is in communication with the data acquisition component and performs analysis on the acquired transition data to automatically determine if the machine has experienced a downtime event (column 3, lines 10-19) and, independent of the control program, develops a probability prioritized inventory of which channel likely caused the downtime event (column 5, lines 34-41), and a data storage component that is in communication with the data acquisition component to store the acquired transition data and establish a historical pattern of transition data (column 3, lines 35-43).

Williams also discloses comparing the dynamic historical pattern of transition data, chosen from a pre-selected library of dynamic historical patterns (column 5, lines 49-61), to the current transition data, independent of the control program, to determine the operational status of the machine (column 3, lines 44-54 and column 5, lines 18-24).

Williams discloses that the remote/stand alone monitoring device (column 3, lines 20-22) comprises a display device (column 3, lines 22-25), in communication with the data storage component, that displays a cycle count of the repeatably cyclic transition data (column 2, lines 1-9), the prioritized channel inventory ("94" in Figure 5), and the overall operational status of the machine (column 1, lines 49-58).

Williams also discloses that the analysis component performs analysis on the acquired transition data to automatically, and without user-input, determine, store, and display, whether the machine has experienced a downtime event (i.e. a machine fault) (column 1, lines 16-20 and column 5, lines 33-40) as well as if one of the digital channels intermittently experiences an unexpected transition absent a downtime event (column 5, lines 3-24) wherein the unexpected transition is characterized by a statistically significant deviation (column 5, lines 18-24)

Rockwell Software, "Getting Results with RSRules" (Rockwell) teaches a computerized machine control monitoring system comprising acquiring and storing data about a plurality of digital channels wherein the digital channels are grouped as virtual machines defined by subsets of channels (page 19, "Understanding I/O

groupings” and page 20, lines 1-3). Rockwell Software also teaches displaying a reaction-time diagram with user defined names (i.e. identifiers) for each of the digital channel/virtual machine groups of run-time data indicating the time-on of a current transition and a time to off of a current transition (i.e. runtime from a pre-defined start) with respect to a tolerance level (i.e. indicating a status) based on historical transition data for each of the machines substantially simultaneously (page 4, Figure). Rockwell also teaches determining the overall performance of the machine performing several operations based upon global analysis wherein the individual channels are designated to be visible or not visible (i.e. ignored/excluded) in the overall analysis, and wherein the acquired transition data includes transition data for the at least one of said plurality of digital channels that has been designated to be not visible (i.e. ignored/excluded) (page 20, lines 16-27).

U.S. Patent No. 5,870,693 to Seng et al. teaches an apparatus and method for diagnosis of abnormality in processing equipment comprising production equipment that executes a plurality of steps of a sequence under the control of a PLC (column 4, lines 27-31), a display device that provides information relative to a downtime event (column 4, lines 44-55), and a detecting means for determining the channel of data that likely caused the downtime event by analyzing the time sequenced proximity to the downtime event (column 9, lines 1-17 and 49-56).

U.S. Patent No. 5,949,676 to Elsley teaches a method and system for diagnosing the behavior of a machine controlled by a discrete event control system comprising developing diagnostic rules based on discrete event timing patterns that occur during operation of the machine and evaluating the occurrence of the discrete events relative to the diagnostic rules to identify malfunctions in the behavior of the machine (column 2, lines 18-23). Elsley also teaches that the diagnostic rules are defined based on statistical analysis, such as standard deviation, of the repetitions of the machine timing pattern (column 2, lines 36-44) and that the occurrence of a downtime event is determined by a statistically significant deviation in combination with an expired downtime timer (column 9, line 60 to column 10, line 7).

U.S. Patent No. 5,586,156 to Gaubatz teaches an automatic self-testing and diagnostic system comprising discriminating against failed sensors by automatically entering a predetermined state when failures are detected through a comparison between current data and theoretical data (column 2, line 59 to column 3, line 2), measuring current start-up data, and comparing the measured start-up data to a predetermined set of reference data stored in the device software instructions (column 5, line 61 to column 6, line 2).

U.S. Patent No. 5,319,353 to Ohnishi et al. teaches a method of monitoring a test handling machine which is capable of displaying the occurrence, and position, of an error or other inadequacy (column 3, line 67 to column 4, line 5) using a display

panel (column 4, lines 15-24) as well as a color-coded stack alarm light, attached to the housing of the machine, that displays the operational status of the machine (column 7, line 64 to column 8, line 2, and "45" in Figure 3).

U.S. Patent No. 6,226,762 to Foote et al. teaches a system and method for providing delayed start-up of an activity monitor in a distributed I/O system comprising an I/O module that specifies a plurality of channel lines that are ignored.

U.S. Patent No. 4,964,065 to Hicks et al. teaches a computer-controlled electronic system monitor comprising a plurality of analog input channels each designated by a corresponding type including a type "0" denoting that the inputs from the channel will be ignored.

U.S. Patent No. 5,923,903 to Alvarez-Escurra et al. teaches a programmable logic controller input-output system including a plurality of channels characterized by several job functions.

As noted above, the cited prior art teaches many of the features of the claimed invention and while the cited prior art, specifically Rockwell Software ("RSRules"), does teach a reaction-time diagram of run-time data indicating the time-on of a current transition and a time to off of a current transition with respect to a tolerance level based on historical transition data, for each of a plurality of digital channels

individually, none of the cited prior art teaches or suggests, in combination with the other claimed limitations for a CMC monitoring system, specifically a viewing component displaying a sequence diagram (i.e. a graph showing the sequential progression of operations of a plurality of channels concurrently) of a historical pattern of transition data defined by a first average, as defined by equation 2 of the specification, transition time to on, a second average transition time to off, and a duration time of each of a plurality of channels on an individual basis and a sequence diagram of current transition data.

Further, since RSRules is only concerned with a historical tolerance to determine if the current data falls within reaction transition limits and does not have an interest in any time-to-on or duration aspects of the historical data, there would be no motivation to add such information to the display.

6. The following references are also cited as being pertinent to the instant Examination:

U.S. Patent No. 5,008,842 to Nagai et al. teaches a method of sequential monitoring and apparatus for practicing the same including determining an average tolerance based on historical sequence pattern data for comparison to current data. Nagai, however, does not teach any display of a sequence of historical patterns and, like RSRules, is only concerned with a historical tolerance to determine if the current data falls within limits and does not have an interest in any time-to-on or duration aspects of the historical data.

U.S. Patent No. 6,665,648 to Brodersen et al. teaches state models for monitoring process.

U.S. Patent No. 6,229,433 to Rye teaches a diagram for implementing appliance control.

U.S. Patent No. 6,014,612 to Larson et al. teaches remote diagnostics in a process control network having distributed control functions.

U.S. Patent No. 5,469,352 to Yukutomo et al. teaches an operation history display device of a numerical control apparatus.

U.S. Patent No. 5,453,933 to Wright et al. teaches a CNC control system.

U.S. Patent No. 4,734,869 to Mickowski teaches a diagnostic method for analyzing and monitoring the process parameters in the operation of reciprocating equipment.

U.S. Patent No. 4,471,348 to London et al. teaches a method and apparatus for simultaneously displaying data indicative of activity levels at multiple digital test points in pseudo real time and historical digital format, and display produced thereby.

As noted above, the pertinent prior art teaches many of the features of the claimed invention but fail to teach or suggest, in combination with the other claimed limitations for a CMC monitoring system, specifically a viewing component displaying a sequence diagram (i.e. a graph showing the sequential progression of operations of a plurality of channels concurrently) of a historical pattern of transition data defined by a first average, as defined by equation 2 of the specification, transition

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time to on, a second average transition time to off, and a duration time of each of a plurality of channels on an individual basis and a sequence diagram of current transition data.

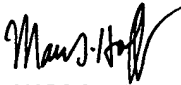
7. Any comments considered necessary by Applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (571)272-2226. The examiner can normally be reached on Monday through Friday, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (571)272-2216. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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